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E OMB PEER REVIEW BULLETIN

On December 16, 2004, the Office of Management and Budget (OMB) issued a directive requiring Federal Agencies to have "influential scientific information" and "highly influential scientific assessments" peer reviewed. NMFS decided that certain sections of the Draft Consolidated Atlantic HMS FMP could contain "influential scientific information," which is defined as: scientific information (factual inputs, data, models, analyses, technical information, or scientific assessments) that the agency reasonably can determine does have or will have a clear and substantial impact on important public policies or private sector decisions. As such, NMFS requested three scientists who were not involved in the drafting of HMS FMP to review certain sections of the HMS FMP. Specifically, NMFS asked them to review the standardized bycatch reporting methodology (Sections 3.8.2 through 3.8.5), time/area closure analyses (Section 4.4.2 and Appendix A), and essential fish habitat (EFH) sections (Chapter 10 and Appendix B).

Per the OMB peer review bulletin, NMFS noted that such a peer review should evaluate the clarity of hypotheses, the validity of the research design, the quality of data collection procedures, the robustness of the methods employed, the appropriateness of the methods for the hypotheses being tested, the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall product. The peer reviews will be used, as appropriate, to clarify assumptions, findings, and conclusions of the bycatch, time/area closure, and EFH sections of the Final HMS FMP. Their reviews are reproduced in their entirety below. A copy of Gregory Skomal's certification of no conflict of interest is on file with the HMS Management Division.

The following sections provide each peer reviewer's complete comments, followed by a response section by NMFS. In the response section, NMFS uses the same section headings used by the peer reviewer to respond to the comments. NMFS used this approach of providing the peer reviewer's comments in their entirety to offer the reader the full context of the reviewer's comments, for ease of reading, and to avoid any confusion between the reviewer's comments and NMFS' response which follows each reviewer's section.

E.1 Peer Review by Gregory Skomal, Commonwealth of Massachusetts, Division of Marine Fisheries, December 21, 2005

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December 21, 2005

Mr. John H. Dunnigan
Director, Office of Sustainable Fisheries
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Dear Mr. Dunnigan:

As per your request, I've conducted a peer review of the following sections of the Draft Consolidated Atlantic Highly Migratory Species Fishery Management Plan: Sections 3.8.2-3.8.5 (Standardized Bycatch Reporting Methodology), 4.4.2 (Time/Area Closures), Chapter 10 (Essential Fish Habitat) and associated appendices (A, B).

In doing so, I made every effort to evaluate the clarity of hypotheses, the validity of the research design, the quality of the data collection procedures, the robustness of the methods employed, the appropriateness of the methods for the hypothesis being tested, the extent to which the conclusions follow from the analysis, and the strengths and limitations of the overall product. My comments on each of the sections follow.

Please do not hesitate to contact me for any additional information. I thank you for the opportunity to comment on this important Fishery Management Plan.

Sincerely,

Gregory Skomal
Senior Marine Fisheries Biologist

Section 3.8.2: Standardized Reporting of Bycatch

This section describes and discusses the three major sources of bycatch data for HMS: self-reported logbook data, at-sea observer data, and survey data. While this would imply three discrete sources, fishery-specific information indicates that there are multiple self-reporting programs (e.g. HMS logbook, vessel trip reports, supplemental discard forms), two observer programs, and two recreational dockside surveys. I suggest that a table or two be added to this section to clarify each of these programs on a fishery-specific basis and to eliminate any potential redundancies.

Section 3.8.2.6: Recreational Handgear Fishery

For the last several years, members of the US Advisory Committee to ICCAT have questioned the validity of HMS catch and bycatch estimates derived from the two recreational surveys (MRFSS and LPS). Specifically, the BAYS species working group stated in 2005 that "MRFSS and LPS landings data collection programs are fatally flawed and have failed. It is time to acknowledge that they cannot be further modified or adapted for the current needs of fishery management. The BAYS SWG recommends the development of a HMS landings data collection program that meets high standards for accuracy and precision." While NMFS notes that CV's are very high for most HMS estimates derived from these sources, there has been little effort to alleviate this longstanding problem over the last several years.

Section 3.8.5: Bycatch Mortality

This section presents very qualitative information on fishery-specific bycatch mortality. In my view, this section is incomplete. Although NMFS purports to have estimates of bycatch and bycatch disposition, these data are not reported on a fishery-specific or species-specific basis. I suggest that this section or section 3.4.6 be augmented to include these data so that the reader has a quantitative sense of this issue. For example, a table containing annual fishery-specific estimates of HMS bycatch (e.g. blue shark) including catch disposition (released alive, dead discards) would be very useful.

Bycatch mortality comprises two issues, direct mortality and post-release mortality, which have been combined into a single section. These two issues should be addressed separately to avoid confusion. Estimates of direct mortality are derived from bycatch data sources, but estimates of release mortality require catch disposition information coupled with species and fishery-specific release mortality rates. Although the latter is largely lacking for most HMS bycatch species, the section on release mortality should consolidate what is known to date on a fishery-specific basis. The new section would include the published information on billfish release mortality currently referenced under "Recreational Handgear Fishery". It should be noted that Kerstetter et al. (2003) conducted similar research on longline-caught blue marlin.

Moreover, section 3.8.2 states that "post-release mortality of HMS is accounted for in stock assessments to the extent that the data allow". However, there is no indication in the current section that post-release mortality rates are incorporated into stock assessments. The section

should include a table summarizing fishery and species-specific estimates of post-release mortality rates and post-release bycatch mortality (numbers of fish) used in stock assessment.

Section 4.1.2/Appendix A: Time/Area Closures

NMFS provides an extensive and comprehensive analysis of the ecological/economic/social benefits and impacts of existing and proposed time/area closures. In virtually all cases, the ecological benefits are inversely related to the economic impacts and both are greatly influenced by the potential redistribution of effort. Without redistribution of effort, there are ecological benefits and discard reductions across all species, but economic and social impacts. With redistribution of effort, all of the time/area closures analyzed have positive and negative feedbacks that render none of them fully effective. Given the assumption of effort redistribution, it is difficult to believe that NMFS will be able to implement a time/area closure that does not have ecological impacts that counter positive gains. Hence, for time/area closures to be effective, assumptions on effort redistribution need to be rigorously tested. There are strong indications that there was not a significant spatial redistribution of effort resulting from the current time/area closures (Table 4.9). Moreover, discard reductions realized by the current closures met or exceeded those predicted without the redistribution of effort (Tables 4.7, 4.8). However, as stated in the draft FMP, reality likely lies between no effort redistribution and complete redistribution.

In light of this conundrum, I concur with the preferred option (B5) to establish criteria to consider when implementing new time/area closures or making modifications to existing time/area closures. These criteria must include objective quantitative thresholds for bycatch reduction taking into account those factors listed under this alternative (page 4-34) as well as status of the stocks, assessment information, and stock rebuilding schedules. In addition, as stated above, discard reduction analyses should make every attempt to test hypotheses of effort redistribution while taking into account the potential influence of declining stocks.

Minor edit: There is an inconsistency between the percent reduction of bluefin tuna discards reported in Table 4.6 and Table 4.11. For alternatives B2(d), B2(e), and B2(a)/B2(b)(year round) the former lists -3.3%, 5.7%, and -24.3% respectively; these are reflected in the text. However, Table 4.11 reports different values of 38%, -40.7%, and -19.1%, respectively. Two of these values counter the arguments presented in the text.

Chapter 10/Appendix B: Essential Fish Habitat

In this chapter and the associated appendix (B), NMFS presents a comprehensive five-year review of Essential Fish Habitat (EFH) for all HMS. In addition, the chapter makes every effort to identify fishing and non-fishing activities that may adversely affect EFH. EFH is defined as "those habitats necessary to the species for spawning, breeding, or growth to maturity".

Section 10.2.1: Descriptions of Datasets Used in the Review

In addition to the datasets used in the current analyses, two surveys are conspicuously absent. The NEFSC Longline Shark Survey has been conducted by the NMFS Apex Predators

Investigation for no less than 30 years. These biological surveys targeted pelagic sharks, swordfish, and tunas in the early years and large coastal sharks in recent years. Like the Southeast Fishery Longline Shark Survey, biological and associated environmental data are collected from all captures and most fishes are tagged and released. This survey would contribute useful fisheries independent data. Also, the now defunct CETAP (Cetacean and Turtle Assessment Program) survey is another fisheries independent historical source of distribution data on large pelagic fishes (see Kenney et al., 1985). This is particularly important for shark species that are not routinely taken in fisheries (e.g. basking shark).

Section 10.2.2: Methods Used to Map and Analyze EFH Data

While it is clear that size stratified spatial data from multiple sources were plotted to identify areas of high concentration, it is unclear how this grid will be used to designate EFH.

Section 10.3: Summary of Review and Findings

Reference to the McCandless et al. (2002) study should note that 15 separate research studies were conducted from Massachusetts to Texas, not New York to Texas.

As written, the text in this and the previous section implies that new EFH has been designated based on recent information. However, it is stated in the Introduction (Section 10.1) that EFH has not been modified from the 1999 designations and that the current review is simply to provide new EFH information and data collected since that time. Since there is a great deal of discussion regarding new EFH information and species-specific descriptions of EFH, clarification is warranted.

Section 10.3.2: Swordfish

Reference to juvenile swordfish in the vicinity Long Island Sound needs to be substantiated. Perhaps this information refers to historical reports of swordfish east of Long Island in the vicinity of Block Island and Nomans Island south of Martha's Vineyard.

Appendix B: Essential Fish Habitat

Many of the species-specific descriptions in this appendix present life history information that has been updated or replaced with new or more applicable research findings. In the following sections, I've noted recently published literature that may assist NMFS in identifying EFH for several species of HMS.

B.1.4.1: Basking Shark

Distribution data for the basking shark is incomplete largely because the species is not commonly taken by fisheries. EFH for the basking shark should include waters east of the Great South Channel and the Gulf of Maine to the Bay of Fundy. Pertinent information on life history and distribution of the basking shark in the North Atlantic may be found in Templeman (1963),

Owen (1984), Kenney et al. (1985), Sims and Merrett (1997), Sims and Quayle (1998), Sims (1999), Sims et al. (2000), Skomal et al. (2004), and Wilson (2004).

B.1.4.2: Hammerhead Sharks

Scalloped Hammerhead

Additional life history information can be found in Lessa et al. (1998), Hazin et al. (2001), and Bush and Holland (2002).

B.1.4.3: Mackerel Sharks

White Shark

In all likelihood, EFH of the white shark will need to be modified. The review by Casey and Pratt (1985) is a comprehensive size-specific examination of white shark distribution, life history, and nursery habitat in the western North Atlantic. Preliminary estimates of age and growth of this species were recently conducted by Natanson (2002). Estrada et al. (in press) present new information on the trophic ecology of this species in the western North Atlantic based on stable isotopes.

Nurse Shark

This species should not be listed under Mackerel Sharks (Section B.1.4.3).

B.1.4.4: Requiem Sharks

Blacktip Shark

Additional information on blacktip shark nursery habitat can be found in Heupel and Hueter (2002), Heupel and Simpfendorfer (2002), Keeney et al. (2003), Heupel et al. (2004), Keeney et al. (2005), and Heupel and Simpfendorfer (2005a; 2005b).

Bull Shark

Additional information on bull shark life history and nursery habitat can be found in Tremain et al. (2004), Neer et al. (2005), and Simpfendorfer et al. (2005).

Dusky Shark

Age and growth information can be found in Natanson et al. (1995).

Lemon Shark

Additional life history information can be found in Sundstrom et al. (2001) and Barker et al. (2005).

Night Shark

Hazin et al. (2000) and Santana and Lessa (2004) provide additional information on reproduction and age and growth, respectively.

Spinner Shark

Additional life history information on the spinner shark can be found in Allen and Wintner (2002), Capape et al. (2003), Bethea et al. (2004), Carlson and Baremore (2005), and Joung et al. (2005).

Tiger Shark

More recent age and growth information on the tiger shark can be found in Natanson et al. (1999) and Wintner and Dudley (2000).

B.1.4.5: Sand Tiger Sharks

Sand tiger shark

Additional information on the sand tiger shark may be found in Gelsleichter et al. (1999) and Lucifora et al. (2002).

B.1.4.6: Whale Sharks

Additional life history information can be found in Chang et al. (1997), Colman (1997), and Wintner (2000).

B.1.4.8: Hammerhead Sharks

Bonnethead

Additional life history information can be found in Cortes et al. (1996), Cortes and Parsons (1996), Cortes et al. (1996), Carlson and Parsons (1997), Lessa and Almeida (1998), Marquez-Farias et al. (1998), Carlson et al. (1999), and Lombardi-Carlson et al. (2003).

B.1.4.9: Requiem Sharks

Atlantic Sharpnose Shark

Additional life history information can be found in Cortes (1995), Marquez-Farias and Castillo-Geniz (1998), Gelsleichter et al. (1999), Carlson and Baremore (2003), Hoffmayer and Parsons (2003), Loefer and Sedberry (2003), and Bethea et al. (2004).

Blacknose Shark

Additional life history information can be found in Carlson et al. (1999), Hazin et al. (2002), and Driggers et al. (2004a; 2004b).

Finetooth Shark

Additional life history information can be found in Carlson et al. (2003), Hoffmayer and Parsons (2003), and Bethea et al. (2004).

Smalltail Shark

Additional life history information can be found in Lessa and Santana (1998) and Lessa et al. (1999b).

B.1.5.1: Cow Sharks

Sixgill Shark

Additional life history information can be found in Ebert (2002) and McFarlane et al. (2002).

B.1.5.2: Mackerel Sharks

Porbeagle Shark

More recent life history information can be found in Francis and Stevens (2000), Jensen et al. (2002), Joyce et al. (2002), Natanson et al. (2002), Campana and Joyce (2004), and Francis and Duffy (2005).

Shortfin Mako Shark

Additional life history information can be found in Stillwell and Kohler (1982), Pratt and Casey (1983), Heist et al. (1996), Mollet et al. (2000), Campana et al. (2002), Estrada et al. (2003), Francis and Duffy (2005), Loefer et al. (2005), and MacNeil et al. (2005).

B.1.5.3: Requiem Sharks

Blue Shark

Additional life history and ecological information can be found in Kenney et al. (1985), Estrada et al. (2003), and Skomal and Natanson (2003).

Oceanic Whitetip Shark

Additional life history information can be found in Lessa et al. (1999a), Lessa et al. (1999c), and Whitney et al. (2004).

B.1.5.4: Thresher Sharks

Bigeye Thresher

Additional life history information can be found in Chen et al. (1997), Liu et al. (1998), and Weng and Block (2004).

Thresher Shark

New age and growth information can be found in Gervelis (2005).

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E.2 Response to OMB Peer Review by Gregory Skomal, Commonwealth of Massachusetts, Division of Marine Fisheries, December 21, 2005

Section 3.8.2: Standardized Reporting of Bycatch

The reviewer indicated that there was some confusion as to the various reporting programs for the different fisheries which harvest HMS. Additional clarification was added to the descriptions in the text.

Section 3.8.2.6: Recreational Handgear Fishery

The reviewer indicated that the catch and bycatch estimates derived from the programs used to monitor recreational landings of HMS have been questioned by members of the U.S. ICCAT Advisory Committee and that changes should be made to ensure that high standards of accuracy and precision are met. NMFS recognizes the desire to make improvements in the collection of recreational catch and landings data. At the request of NMFS, the NAS recently conducted a review of marine recreational fishery surveys, both state and federal. The review committee's report has been published and the Agency is evaluating the recommendations.

Section 3.8.5: Bycatch Mortality

The reviewer suggested that this section be augmented by adding estimates of bycatch and bycatch disposition on a fishery-specific basis. This information has been included for those fisheries where it is available and can be found in Section 3.4.

Section 4.1.2/Appendix A: Time/Area Closures

The review noted that the criteria must include objective, quantitative thresholds for bycatch reduction taking into account those factors listed under this alternative as well as status of the stocks, assessment information, and stock rebuilding schedules. In addition, the reviewer stated that discard reduction analyses should make every attempt to test hypotheses of effort redistribution while taking into account the potential influence of declining stocks.

NMFS does not believe that established quantitative thresholds for strict bycatch reduction percentages need to be created for specific time/area closures. Pre-determined target reduction goals for specific species are inappropriate because it does not consider the impact on the remaining portion of the catch. By not setting such thresholds, NMFS retains the flexibility of considering percent change of bycatch for all species before implementing a time/area closure. Consideration of the overall catch is critical when implementing a multispecies or ecosystem-based approach to management. Furthermore, while the Magnuson-Stevens Act provides NMFS the authority to manage all species, NMFS must balance the impacts of management measures on all managed species and may not choose protections for one species to the detriment of protected or overfished species (*e.g.*, NMFS may not choose to protect BFT even if sea turtle interactions may increase substantially). Under the approach preferred in this rulemaking (the criteria), NMFS can consider the largest range of alternatives when considering time/area closures. For example, if NMFS is given a specific goal (*e.g.*, a jeopardy conclusion regarding

the PLL fishery and leatherback sea turtles), this flexibility outlined in the criteria allows NMFS to close certain areas or take other actions to protect that specific species while also protecting, to the extent practicable, the other species and the rest of the fishery. Absent this flexibility, NMFS might potentially have to implement more restrictive measures to protect one species causing potential cascade effects (*e.g.*, closing one area may increase the bycatch of another species, which could result in closing another area, etc.).

NMFS already considers the status of the stocks when implementing time/area closures. Closed areas like the Northeastern U.S. closed area, the mid-Atlantic shark closed area, and the Northeast Distant closed area were all implemented to address specific overfished or protected species. The other closed areas, while implemented to reduce bycatch in general, also considered the status of the stocks before implementation. In addition, considering the status of a stock is one criterion in the preferred alternative, B5.

NMFS currently does not test "hypotheses" of effort redistribution, but agrees that assumptions of the redistribution of effort need to be tested. To test this model, NMFS explored different assumptions regarding the movement of the PLL fleet and how more limited movements by the fleet may affect predictions regarding bycatch reduction. NMFS investigated the movement of the PLL fleet from 2001 through June of 2004 to see where vessels fished in relation to their reported homeports. This mobility analysis broke the Atlantic, Caribbean, and Gulf of Mexico into six distinct areas, with one area, Area 2, split along the west and east coasts of Florida (Areas 2A and 2B, respectively). Using GIS, NMFS plotted the locations vessels reported fishing (*i.e.*, made sets) in six different areas in relation to their reported homeport in order to determine the distance different vessels traveled. Overall, of the vessels that moved out of the Gulf of Mexico, the majority (80 percent in terms of hooks) moved out of the Gulf of Mexico (Areas 1 and 2A) into Area 6, the high seas, but other vessels also moved from the Gulf to the eastern seaboard. Conversely, a few vessels that fished along the eastern seaboard also moved into the Gulf of Mexico, although the movement was somewhat limited.

NMFS also investigated the physical characteristics of vessels to see if there were any differences in the vessels that reported fishing only in the Gulf of Mexico compared to vessels that reporting fishing out of the Gulf of Mexico. NMFS found no significant difference in the vessels' length ($t_{104} = 0.43$, $P = 0.35$) or vessels' horsepower ($t_{104} = 0.43$, $P = 0.66$) for vessels that fished only in the Gulf of Mexico versus those that fished out of the Gulf of Mexico. These results indicate that vessels that fish exclusively in the Gulf of Mexico have the physical capability (in terms of vessel size and horsepower) to fish outside of the Gulf of Mexico. Furthermore, despite the upgrading restrictions, this indicates that the Gulf of Mexico vessel owners could sell their permits to fishermen who may want to fish outside the Gulf of Mexico.

Based on these analyses, NMFS evaluated different scenarios of the redistribution of effort model where each scenario had a different assumption regarding where effort from a closure would be displaced. NMFS calculated redistribution of fishing effort only to open areas along the eastern seaboard for a closure in the Northeast [B2(b)]. NMFS also redistributed fishing effort in the open areas of the Gulf of Mexico and Area 6 for two closures in the Gulf of Mexico [B2(a) and B2(c)]. Taken with the results of not considering redistribution of effort to the full effort redistribution model, these additional scenarios provide estimates of changes in

bycatch and retained catch somewhere in-between the two base scenarios (*i.e.*, some movement is expected, and thus, some redistribution of effort is expected into a particular area (in this case, Area 6)). However, these additional scenarios assume that the same amount of effort is moved out of the Gulf of Mexico regardless of the size of the closure in the Gulf of Mexico, when in reality, larger closures may result in more movement out of the Gulf of Mexico. These scenarios also assume that fishermen do not relocate, possibly due to community ties to unloading docks, processing plants, etc. However, it should be noted that while fishermen may prefer not to disrupt ties to their communities, the 2001-2004 HMS logbook data indicate that fishermen from the Gulf of Mexico already fish outside of the Gulf of Mexico. If a large closure were implemented in the Gulf of Mexico, it is likely that additional fishermen would move their fishing locations or sell their permits rather than go out of business. However, in the future, NMFS intends to investigate the choices fishermen have made regarding previous closures (*i.e.*, did they move, sell their permits, go out of business, retain their permit but fish for something else, etc?). This type of analysis could help NMFS improve the effort redistribution models used in the future.

The reviewer also noted that there was an inconsistency between the percent reduction of BFT discards reported in Table 4.6 and Table 4.11 of the Draft HMS FMP. For alternatives B2(d), B2(e), and B2(a)/B2(b)(year round) the former listed -3.3%, 5.7%, and -24.3% respectively; these were reflected in the text. However, Table 4.11 reported different values of 38%, -40.7%, and -19.1%, respectively. Two of these values countered the arguments presented in the text. NMFS found that the values reported in Table 4.6 were incorrect and the values listed in Table 4.11 of the Draft HMF FMP were correct. NMFS has corrected these discrepancies in the tables and the text of the Final HMS FMP. However, these changes did not affect the overall conclusions.

Chapter 10/Appendix B: Essential Fish Habitat

Section 10.2.1.: Descriptions of Dataset Used in the Review

The reviewer noted that two data sources were conspicuously absent: the NEFSC Longline Shark Survey conducted by the NMFS Apex Predators Investigation, and the CETAP (Cetacean and Turtle Assessment Program) survey which would be particularly important for shark species not normally taken in fisheries such as the basking shark. The NEFSC Longline Shark Survey data was included in the data compiled during the review, but was labeled as Cooperative Shark Tagging Program (CSTP). Thus all shark data collected during the NEFSC Longline Shark Survey were included (C. McCandless pers. comm.). The CETAP survey was not obtained but references have been included in the life history section for basking sharks.

Section 10.2.2: Methods Used to Map and Analyze EFH Data

It was unclear to the reviewer how the grid used to plot data for each of the species would be used to designate EFH. As described in the FMP, the grid has a dual purpose, to allow the viewer to distinguish between low and high number of observations which would be difficult with point data only, and to serve as a guide for potential future modifications to EFH boundaries. The grid could be used to include or exclude a given number of observations per 100 nm^2 area in the EFH boundary. NMFS could establish criteria for each species and use the grid to decide whether to include or exclude those areas. This would allow NMFS to consider different alternatives for EFH boundaries based on different criteria. For example, in Amendment 1 to the FMP, criteria (presented here for reference only) for including or excluding a given number of observations per square were established for each species based on the status of the stock, and used as a guide to identify appropriate EFH areas. For a rebuilt species like blacktip shark, a criteria of greater than 10 observations per 100 nm^2 was used to help identify and map areas as EFH. For an overfished species such as finetooth shark, a more precautionary criteria of > 1 observation per 100 nm^2 was used to help identify and map EFH areas. Thus, the grid might be used in a future rulemaking to analyze potential alternatives based on including or excluding a specific number of observations per 100 nmi^2 area.

Section 10.3: Summary of Review and Findings

Based on the reviewer's comment, the reference to the McCandless et al. (2002) study was modified to note that 15 separate research studies were conducted from Massachusetts to Texas, not New York to Texas. The reviewer commented that the document seemed to imply that new EFH had been designated based on recent information, contrary to what was stated in the Introduction that EFH was not being modified in this FMP. NMFS did not mean to imply that EFH was being modified in this FMP. Rather, NMFS was attempting to provide NOAA technical reviewer's comments and concerns regarding the existing EFH boundaries and whether they considered changes to EFH to be warranted. In some cases the reviewers seemed to indicate that this was the case, but NMFS did not mean to imply that those changes would be made in this FMP. Any references to EFH being modified have been clarified to indicate that no changes are being made at this point.

Section 10.3.2: Swordfish

The reviewer noted that references to juvenile swordfish in the vicinity of Long Island Sound would need to be substantiated. NMFS agrees, and has asked NMFS technical experts to confirm whether they consider the datapoints to be valid. NMFS is awaiting a response from the NMFS technical experts, and would make any necessary changes prior to amending any swordfish EFH boundaries.

Appendix B: Essential Fish Habitat

The peer reviewer noted that many of the references in the life history section had been updated or replaced with new or more applicable research findings. NMFS incorporated all references provided by the peer reviewer in the life history section.

E.3 Peer Review by Chris Boggs and Keith Bigelow, NMFS SWFSC, January 9, 2006

GENERAL COMMENTS:

This consolidated FMP is a mammoth undertaking. The breadth and detail of the information that has been reviewed considered and presented is staggering. The quality of the data information is highly variable and the document does a good job of indicating problems and issues with data sources, and with the appropriateness of their application to management measures. And the document identifies the many areas that require improvement in information and management alternatives based on future study and deliberation. The greatest limitations to the overall products reviewed by PIFSC seems to be in the closed area alternatives, but this is to be expected. The other sections reviewed by PIFSC do not lead directly to management decisions that immediately affect fishery operations.

The section on bycatch could be improved by some clarification of terminology (as indicated in the specific comments). A few areas of information regarding bycatch mortality appear to have been missed, but the document is a comprehensive and thorough compendium of our current position in terms of knowledge and application to management issues as well as the needed direction for improvement. The theory behind establishing a standardized methodology for precision and accuracy in bycatch estimation exceeds the practice, which has been slow to develop and thus is not extensively covered. However the agency is hamstrung by lack of resources even to conduct analyses of cost/improvement ratios in any but a few fisheries, let alone to increase the myriad of observer and other monitoring programs that would be required for all fisheries. Documenting the present status of this effort is the appropriate first step for the FMP, which can present no more than what is the best available information.

The section on area closures presented the most difficulty and the specific comments may prompt clarification of the presentation. The rationale for the preferred alternatives could use strengthening where indicated. It is clear that a very large amount of information and comment was considered and a host of differing objectives had to be balanced. This will always produce choices which reflect compromise. The rationale for some of these choices appears to need some bolstering, especially as they face challenge from specific interest groups.

The section on EFH benefits from a greater wealth of published scientific information than the other sections, and results in no specific management alternatives to be considered at this time. The one identified area for future consideration appropriately awaits further data collection (bottom longline impacts on reef habitat). The rationale for expecting little impact of the fisheries on EFH at present is convincing. The issues for this section revolve around the practice of EFH designation, and these issues are well described and critiques from previous reviews made available. To be more thorough on scientific content this section would have to become encyclopedic, which would not be appropriate to its purpose. Possible errors for one species (specific comment) stood out only because of the focus by the PIFSC on the habitat of this species. The coverage of coastal anthropogenic effects on the HMS EFH is much more thorough than in our FMP for the central and western Pacific…but that seems appropriate given the greater ratio of coasts to ocean.

SPECIFIC COMMENTS:

Bycatch

3.8
Regarding the 2nd par:

"The national goal of the Agency's bycatch plan activities is to implement conservation and management measures for living marine resources that will minimize, to the extent practicable, bycatch and the mortality of bycatch that cannot be avoided. Inherent in this goal is the need to avoid bycatch, rather than create new ways to utilize bycatch. The plan also established a definition of bycatch as fishery discards, retained incidental catch, and unobserved mortalities resulting from a direct encounter with fishing gear."

Fishery Councils may disagree that utilization (and thus reduction) of bycatch is not a valid goal under Magnusson. Can the statement to the contrary be supported more thoroughly?

And in the next section

3.8.1 Bycatch Reduction and the Magnuson-Stevens Act

"The Magnuson-Stevens Act defines bycatch as fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic and regulatory discards. Fish is defined as finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds. Seabirds and marine mammals are therefore considered 'incidental catch.'"

Rather than re-visit here all the discussion about the National Plan's different (from Magnuson) definition of bycatch, it is suggested that the text avoid using incidental catch in two contradictory ways in two succeeding paragraphs. There are clearer and widely-used terms for catch of seabirds and marine mammals, such as "takes of protected species" or "protected species interactions". NOAA Fisheries claims important successes in reducing bycatch" when referring to reductions in seabird and mammal takes, and can continue to do so in a broadly understood use the term "bycatch". But it isn't a broadly understood that "incidental catch" to refer to protected species. "Incidental take" might be better understood.

Next par

"National Standard 9 of the Magnuson-Stevens Act requires that fishery conservation andmanagement measures shall, to the extent practicable, minimize bycatch and minimize the mortality of bycatch that cannot be avoided. In many fisheries, it is not practicable to eliminate all bycatch and bycatch mortality. Some relevant examples of fish caught in Atlantic HMS fisheries that are included as bycatch or incidental catch…"

Should turtles also be listed as examples? They were includsed as fish bycatch under Magnuson-Stevens (was this changed recently?) and some of the subsequently listed options for bycatch reduction in this section are specific to turtles and have no documented utility for reducing any

other bycatch (e.g. large circle hooks reduce turtle bycatch, but otherwise reduce mostly injury or mortality of other bycatch).

Then in a following par

"Therefore, to totally eliminate bycatch of all non-target species in Atlantic HMS fisheries would be impractical. The goal then is to minimize the amount of bycatch to the extent practicable and minimize the mortality of species caught as bycatch."

This statement is laudably practical, and such a statement was requested in the council/public reviews. However, the statement and the preceding discussion leave moot the issue of whether incidental takes of protected species (or just "fish" including [?] turtles) are addressed by the statement. The latter (just fish bycatch) is implied by the heading "Magnuson-Stevens" but the preceding section mentioned broader issues, and the mention of incidental takes in this section implicates protected species due to the use of incidental takes to refer to them in the previous section.

3.8.2 Standardized Reporting of Bycatch

"The National Bycatch Report (NMFS, 2004a) contains an indepth examination of the issues of precision and accuracy in estimating bycatch. Precision of an estimate refers to its variability, or how repeatable the estimate is. The more precise an estimate is, the less variable it is. Precision of estimates is usually expressed in terms of a statistical value, the coefficient of variation (CV) of the estimate (NMFS, 2004a), which is the ratio of the square root of the estimate (also known as the standard error) to the estimate itself."

Both yellow highlighted words should be "variance". I'm not sure the blue highlighted captures the proper meaning. Marti McCracken (PIFSC mathematical statistician) provided the following, more rigorous explanation which might avoid some criticisms regarding your use of "variability" (for your consideration).

"The National Bycatch Report(NMFS, 2004a) contains an in depth examination of the issues of precision and accuracy in estimating bycatch. Accuracy refers to the closeness between the estimated value and the (unknown) true value that the statistic was intended to measure. Precision refers to how closely multiple measurements of the same statistic cluster to one another when obtained under the same protocol. The more precise an estimate is the tighter the cluster. The precision of an estimate is often expressed in terms of the coefficient of variation (CV) defined as the standard error of the estimator divided by the estimate. A precise estimate is not necessarily an accurate estimate."

One might add that "A more precise estimate is more easily distinguished from a second estimate (different time, place, treatment, etc) especially when they are close in value. Testing hypotheses about changes or differences from reference values or limits is the motivation for our interest in the precision and accuracy of bycatch estimates. We frequently need to evaluate whether or not bycatch is altered by events or actions.

Three pars down the document states:

"The CV of an estimate can also be reduced and the precision increased by increasing sample size.

Delete the highlighted "also" which is confusing because no other means of improving CV has yet been mentioned. The prior paragraph listing of randomization, stratification, sampling allocation, and testing for bias pertain to "while striving to achieve accuracy" not to precision. Balancing "precision goals and the least amount of observation effort" is basically the issue of what sample size (= precision) one can afford.

In the following paragraph:

"While the relationship between precision and sample size is relatively well known (NMFS, 2004), the relationship between sample size and accuracy is not so easily determined."

It might be better to say "is not reliable" or "can often be complex" to better anticipate the following paragraph. More samples can mean more or less accuracy. For example, when observer coverage is increased late in a season to catch up to a target level of coverage, the increased sample size may reduce accuracy if not properly stratified and weighted.

3.8.2.3 *Shark Bottom Longline Fishery*

The par starting with "Effective August 1, 2001 …" is u necessarily reproduced in full in the following Section 3.8.2.4.

3.8.4 Evaluation and Monitoring of Bycatch

3rd par. Fix "estimated…estimates". It seems overly cautious to apologize for a lack of bycatch estimates in harpoon fisheries. How does one harpoon an unwanted catch? A proper approach is used under mortality in the next section and should be used here as well.

3.8.5 Bycatch Mortality

3.8.5.2 Mortality by Fishery

Pelagic longline Last sentence says to see section 3.4.1 for more information, inferring more information will be found there on "hook location, trailing gear and injury status of protected species interactions". I couldn't find that information in section 3.4.1 (did I miss it somewhere?). There is a literature on estimating turtle longline mortality, including US policies for estimating turtle mortality from hook location and trailing gear, and extensive tagging studies of post-release mortality, that could be cited and discussed. This lack is particularly at odds with the detailed discussion given on tagging study of released fish mortality below in the recreational handgear section. Nor is the turtle bycatch condition (alive/dead) or estimated post-release mortality covered in the ESA section which follows…where some information on marine mammal and seabird mortality is provided. Turtles seem to be given comparatively short shrift. The longline turtle bycatch mortality estimation also relies on gear configuration (i.e. shallow

and deep setting). And the illustration of longine gear configuration in Section 3.4.1 taken from the Honolulu Advertiser (p.3-89) may be misleading in several ways. For one, this illustration has a strong vertical exaggeration/horizontal compression that gives a "wall of death" impression of the gear configuration. There are better technical illustrations of longline gear configuration in the literature. Second, none of the 5 types of US longline fishing described underneath the figure is close to the illustrated "tuna set" configuration. The latter best describes certain Asian and European fleets in the Atlantic, but not the US. This should be made clear. In a world context, all of the U.S. fisheries (except maybe the Carribean fishery?) are relatively shallow compared with Asian tuna longline fishing.

Purse Seine Fishery
This section is hard to believe. There are huge finfish bycatch mortality issues in Pacific tuna purse seines. The fish can not be easily released alive. Small fish are gillnetted by the mesh and larger ones smothered in the brail. There is an active research program in Europe looking for grids or gratings that can release purse seine bycatch that could be referenced. Pacific purse seine fisheries bycatch of small bigeye and yellowfin tunas is a major cause of overfishing, and there are also huge discarded (dead) bycatches of mahimahi, sharks, and other finfishes documented in IATTC reports. Why assume that discards are small and can easily be released in the U.S. Atlantic purse seine fishery for bluefin? Is it a very different operation? Explain.

Bottom Longline Fishery
Shark Gillnet Fishery Again both of these sections refer the reader to section 3.4.?.? for more information but there is no information on mortality in the cited sections.

4.1.2 Time/Area Closures

Alternative B1 is to maintain the existing time/area closures; no new time/area closures (No Action). There are no tables which present the results from Alternative B1. Isn't this necessary as some of the closures were not in effect (e.g. Mid-Atlantic Closure (effective Jan. 1, 2005, Northeast Distant Restricted (effective June, 30, 2004)) for the entire 2001−2003 period? Maybe these closures are for non-Pelagic fishing. Additionally, on p. 4-21 it says "To determine the effectiveness of the current closures, NMFS compared data prior to implementation of the closed areas (1997−1999) with effort and catch rates from 2001−2003 for various species". I couldn't locate this comparison or a reference. As such this would be a different comparison then Alternatives B2−B7 which compare catch and effort from 2001 to 2003.

Statistical validity − under-reporting in logbooks, assumptions on the redistribution of fishing effort and CPUE. Perhaps the following is addressed in additional documentation, but these are concerns regarding the presented statistics and associated assumptions for the catch and effort analyses. While I realize that the time-frame of a final FMP is rapidly approaching, perhaps the statistical validity of some of these concerns can be better documented or referenced.

Two data sources are used – the Pelagic Observer Program (POP) data and Pelagic Longline Logbook [HMS logbook] data. There is no doubt that various species will either be non-reported or under-reported in logbook data. Figures 4.1 through 4.8 clearly illustrate difference in interaction rates between PPL and POP sets. A comparison of Table 4.5 and 4.6 (A.7) indicates that the percent reduction for most species is greater with the Pelagic Longline Logbook data

than Observer data which may have led to the statement for Alernative B2(a) that "the percent reductions in most bycatch were similar for the observed and reported data, and for the year-round versus May through November closures (4−26)". This is counter-intuitive given the comparison of Figures 4.1−4.8, but may relate to spatio-temporal effects. Is there any analysis or reference by NMFS which compares observer and logbook data for observed longline sets? The absolute numbers and percent reductions for bycatch species using logsheet data would correspond to a minimum value given difficulties associated with under-reporting. In contrast, the percent reductions/increases for retained species are probably more realistic as they are more accurately reported in logbooks.

The assumptions on redistribution of effort and application of corresponding CPUE values are problematic. The current model assumes that effort will be uniformly distributed into all remaining ocean areas. Is a uniform distribution a valid assumption, or could other more plausible assumptions be considered? Specifically, if a portion of the Gulf of Mexico (GOF) is closed, is it reasonable to redistribute effort within open areas of the GOF as well as the Atlantic? While I'm not familiar with longline fleet movements under this FMP, do the fleets routinely move between the GOF and Atlantic and vice-versa? As noted periodically throughout the document, there are interactions that increase due to closed areas because interaction rates are higher in the open areas (e.g. loggerhead turtles). While the uniform distribution is easy to comprehend, could another redistribution scenarios be considered to redistribute effort in the same ocean basin?

The CPUE values are estimated as the number of animals per 1,000 hooks. I could not locate any reference as to how CPUE indices were constructed given a prevalence of zero observations. Given that some animal interactions (e.g. bluefin tuna, sea turtles) represent rare events it would be better to represent the redistribution of effort and corresponding CPUE by a statistical sub-sampling technique rather than a mean CPUE. This would also provide corresponding confidence intervals for bycatch reduction, albeit it is still based on the aforementioned logbook data with potential under-reporting.

I couldn't locate any objectives or decision matrix in deciding on the preferred HMS alternatives. Most of the decisions seem to correspond to a percentage of reduction/increases for retained species/bycatch and associated economics. Perhaps consider a re-evaluation of those alternatives that represent a moderate closed area, such as B2(a) and B2(f) which provide substantial bycatch reduction of white and blue marlin, sailfish and sea turtles. With the redistribution of effort, these areas could have resulted in negative ecological impacts with increased discards of swordfish, bluefin and bigeye tuna. Do the negative impacts result from a redistribution to the Atlantic and associated higher catch rates?

The rational for preferred alternative B4 and benefit to HMS species appears extremely vague. Alternative B4 implements complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserves. There is no indication as to the spatial size of such reserves (it's not illustrated on any of the maps) and curiously there is the statement that "any positive ecological impacts on HMS are expected to be minimal (4-34)". Again, I'm not familiar with Gulf issues, but if this is a gag grouper issue why can't the Gulf Council enact appropriate

regulations as the gag grouper problems and pelagic fishing exploitation appear mutually exclusive?

Preferred alternative B5 appears straightforward, but I'm not certain that it adds much more to the status quo. Doesn't the current FMP have criteria for regulatory framework adjustments for closures, given the fact that closures currently exist?

Appendix A was a very necessary appendix for following the discussion in section 4.1.2.

Chapter 10 – see general comments

Appendix B – see general comments

B.1.1.2 Atlantic Bigeye Tuna (Thunnus obesus)
Regarding "Although its distribution with depth in the water column varies, it is regularly found in deeper waters than are other tuna - to a depth of 250 m." As a Pacific expert this seems surprising to me, since archival tag data show routine behavior to 400 m and deeper, and much older studies also indicate these depths as part of the habitat in the Pacific.

Habitat associations see the IATTC proceedings on the World Bigeye Tuna workshops. There is an extensive literature on dissolved oxygen and temperature as the limiting factor on bigeye tuna depth distribution. Since it is a world meeting with a review for each ocean it may cover differences between oceans that could satisfactorily explain this discrepancy.

E.4 Response to OMB Peer Review by Chris Boggs and Keith Bigelow, NMFS SWFSC, January 9, 2006

General Comments: Bycatch

The reviewers indicated that this section could be improved by some clarification of terminology which they included in the specific comments. These clarifications have been made as suggested.

General Comments: Time/Area

In the general comments section the reviewers noted that the rationale for the preferred alternatives could use strengthening where indicated as well as the rationale for some of these choices appears to need some bolstering, especially as they face challenges from specific interest groups. NMFS used Chapter 2 of the Final HMS FMP to better explain the rationale for the alternatives that were further analyzed. In addition, NMFS used Chapter 4 to clarify reasoning for the preferred alternatives and conducted additional analyses in response to comments from different interest groups.

Specific Comments:

3.8 Bycatch

The reviewer's suggested edits have been incorporated where applicable.

3.8.5.2 Mortality by Fishery

Pelagic Longline

The reviewer's noted that the cross-references for further information did not provide the information as stated. In general, these sections have been revised under Section 3.4 to be more concise and inclusive. The reviewer's suggested that the illustration of longline gear configuration in Section 3.4.1 may be misleading in that it has a strong vertical exaggeration/horizontal compression. NMFS agrees that this illustration may not be representative of how all U.S. longline gear is configured and that it was intended to only portray the gear in a general sense. Additional illustrations of all possible combinations of longline gear configuration would have been confusing to the reader.

Purse Seine Fishery

The reviewer's raised concerns regarding bycatch issues in the Atlantic BFT purse seine fishery by comparisons to the Pacific tuna purse seine fishery. Finfish bycatch and protected species interactions in the Atlantic purse seine fishery have not been an issue to date and the scope of the fishery is limited to only five vessels, whereas there are over one hundred purse seine vessels listed in the 2005 LOF for the Pacific tuna fishery.

Bottom Longline Fishery

The reviewer's noted that the cross-reference for further information did not provide the information as stated. In general, these sections have been revised under Section 3.4 to be more concise and inclusive.

4.1.2 Time/Area Closures

The reviewers stated that there were no tables which presented the results from Alternative B1. The reviewers felt that this was necessary and questioned whether some of the closures were not in effect (e.g. Mid-Atlantic Closure (effective Jan. 1, 2005, Northeast Distant Restricted (effective June, 30, 2004)) for the entire 2001−2003 period.

In the no action alternative, B1, NMFS evaluated the effect of the June Northeastern U.S. closure (effective June 1, 1999), the DeSoto Canyon (effective November 1, 2000), the Charleston Bump and Florida East Coast closures (effective March 1, 2001), and the Northeast Distant closed area (effective July 9, 2002, modified July 6, 2004). The Northeast Distant area is currently a restricted fishing area with specific gear requirements (69 FR 40734, July 6, 2004). Since most of the time/area closures were implemented in 2001 or earlier, data from 2001 - 2003

provided the basis for evaluating the effectiveness of the closures. NMFS did not re-evaluate the mid-Atlantic shark closure because, as described in the response to a petition for rulemaking from the State of North Carolina (October 21, 2005, 70 FR 61286), the closure was first effective in 2005, and NMFS did not have any additional information on which to change the conclusions of the rulemaking that established the closure (December 24, 2003, 68 FR 74746). In addition, this is the only closure that is for bottom longline gear; the rest of the closures are for pelagic gear. In the Draft HMS FMP Tables 4.7, 4.8, 4.9, and 4.10 showed the results the analysis for alternative B1. NMFS has also made sure to reference the appropriate tables in Chapter 4 of the Final HMS FMP.

The reviewers also noted that they could not locate the comparison of data prior to implementation of the closed areas (1997−1999) with effort and catch rates from 2001−2003 for various species, which NMFS used to evaluate the effectiveness of the current time/area closures. As noted above, Tables 4.7, 4.8, 4.9, and 4.10 showed the results the analysis for alternative B1 in the Draft HMS FMP. In the Final HMS FMP, NMFS clarified the references to these tables.

The reviewers also noted concerns regarding underreporting in logbooks and how this would affect the assumptions on the redistribution of fishing effort and catch-per-unit-effort (CPUE). NMFS is aware that discards may be underreported in the HMS logbook data compared to the POP data. However, NMFS tested to see if there were any differences in underreporting for different species between different regions. If no differences in underreporting occurred between regions, then the relative effect of each closure on bycatch reduction for each species should be comparable across alternatives. In order to test this, NMFS compared HMS logbook data to POP data for a dataset provided by Cramer (2000), which compared dead discards from HMS logbook and POP data. In her paper, Cramer used POP data to estimate dead discards of undersized swordfish, sailfish, white and blue marlin, and pelagic sharks from the PLL fishery operating in the U.S. Atlantic, Caribbean and Gulf of Mexico. Cramer (2000) provided the ratio of catch estimated from the POP data divided by the reported catch in the HMS logbooks. This ratio indicated the amount of underreporting for different species in a given area. NMFS analyzed the ratios in Cramer (2000) to test whether underreporting varied for different species in different parts of the Atlantic, Caribbean, and Gulf of Mexico. NMFS used a Kruskal-Wallis test (a non-parametric test equivalent to a parametric Analysis of Variance) to account for small sample sizes and non-normally distributed data. NMFS found that there was no difference in the ratio of estimated catch versus reported catch for undersized swordfish, sailfish, blue marlin, white marlin, or pelagic sharks (undersized swordfish: Chi-square=3.63; *d.f.*=5; *P*=0.60; sailfish: Chi-square=1.72; *d.f.*=5; *P*=0.89; blue marlin: Chi-square=3.89; *d.f.* =5; *P*=0.57; white marlin: Chi-square=2.97; *d.f.* =5; *P*=0.70; pelagic sharks: Chi-square=4.78; *d.f.* =5; *P*=0.44). Therefore, there were no differences in underreporting between the POP and HMS logbooks for the different species in the Atlantic, Caribbean, or Gulf of Mexico. Based on the available information, NMFS believes HMS logbooks may underestimate the amount of bycatch, however, the relative effect of each closure for each species should be comparable across alternatives. While the data used in the Cramer (2000) study represented an earlier time period (1997-1998) compared to the 2001-2003 data used here, it gives some indication that the use of HMS logbook data over POP data should not invalidate or bias the results of the time/area analyses.

In addition, the reviewers noted that a comparison of Tables 4.5 and 4.6 in the Draft HMS FMP indicated that the percent reduction for most species is greater with the HMS logbook data than POP data, which may have led to the statement for alternative B2(a) that "the percent reductions in most bycatch were similar for the observed and reported data, and for the year-round versus May through November closures..." The reviewers stated this was counter-intuitive given the comparison of Figures 4.1−4.8, but may relate to spatio-temporal effects. It must be noted that the POP data only represents, on average, effort of approximately five percent of the PLL fleet, and extrapolated takes were not estimated in the Draft HMS FMP. While the POP data may more accurately report all of the bycatch associated with a given trip, it does not represent the entire PLL fishing effort. And, while underreporting may be occurring for certain species in the HMS logbooks, the HMS logbooks represent all of the PLL effort by the U.S. Atlantic PLL fleet; therefore, in absolute terms, the HMS logbook data would give the highest number of discards, and thus, the highest amount of bycatch reduction for analyses without the redistribution of effort. While the number of sets observed in the POP is much lower than the total reported sets in the HMS logbook, the relative percent reductions in bycatch were similar regardless of the dataset used.

The reviewers also asked if there was any analysis or reference by NMFS which compares POP and HMS logbook data for observed longline sets. The reviewers noted that the absolute numbers and percent reductions for bycatch species using logbook data would correspond to a minimum value given difficulties associated with underreporting. In contrast, the percent reductions/increases for retained species were probably more realistic as they are more accurately reported in logbooks. NMFS agrees that underreporting for bycatch may occur in logbook data whereas underreporting of target catch may occur in POP data. NMFS chose to use HMS logbook data for all the analyses so as to maintain consistency among the alternatives and species. If NMFS were to have used the POP data for all of the species, NMFS would have had to calculate extrapolated takes for all the species considered. NMFS felt that this extrapolation would introduce more assumptions and uncertainty than using HMS logbook data to analyze the potential impacts of time/area closures. And, if, in fact, retained catch is underreported in the POP data, then NMFS would have had the same problem with the retained catch as the reviewers noted with bycatch with in HMS logbook data. Additionally, if the maximum bycatch reductions would be seen using POP data, then the maximum bycatch increases would also be seen using POP data once extrapolated takes were calculated and redistribution of effort was considered. Therefore, NMFS felt that the relative effect of each closure could best be attained with the HMS logbook data in terms of predicted changes in bycatch, discards, and retained catch. In addition, NMFS was able to introduce the least amount of uncertainty and assumptions using HMS logbook data over extrapolated POP data. NMFS will continue to investigate potential differences in reporting between HMS logbook and POP data for all discarded species as well as potential biases in reporting between geographical areas for different species.

The two reviewers also stated that the assumptions on redistribution of effort and application of corresponding CPUE values were problematic. They asked if a uniform distribution is a valid assumption, or could other more plausible assumptions be considered? Specifically, they asked if a portion of the Gulf of Mexico is closed, is it reasonable to redistribute effort within open areas of the Gulf of Mexico as well as the Atlantic? They also asked if the fleets routinely move between the Gulf of Mexico and Atlantic and vice-versa?

Finally, they noted that while the uniform distribution is easy to comprehend, could another redistribution scenario be considered to redistribute effort in the same ocean basin?

NMFS explored different assumptions regarding the movement of the PLL fleet and how more limited movements by the fleet may affect predictions regarding bycatch reduction. As explained in the response to the Skomal review, NMFS investigated the movement of the PLL fleet from 2001 through June of 2004 to see where vessels fished in relation to their reported homeports using 2001-2004 HMS logbook data. Based on these analyses, NMFS evaluated different scenarios of the redistribution of effort model where each scenario had different assumptions regarding where effort from a closure would be displaced. Taken with the results of not considering the redistribution of effort to the full effort redistribution model, these additional scenarios provide estimates of changes in bycatch and retained catch somewhere in-between the two base scenarios (*i.e.*, some movement is expected, and thus, some redistribution of effort is expected into a particular area).

The reviewers claimed that the CPUE values were estimated as the number of animals per 1,000 hooks. The reviewers stated that they could not locate any reference as to how CPUE indices were constructed given a prevalence of zero observations. Given that some animal interactions (e.g. BFT, sea turtles) represent rare events, the reviewers felt that it would be better to represent the redistribution of effort and corresponding CPUE by a statistical sub-sampling technique rather than a mean CPUE. The reviewers stated that this would also provide corresponding confidence intervals for bycatch reduction, albeit it would still be based on the aforementioned logbook data with potential underreporting.

NMFS believes that the reviewers misunderstood how the logbook data were analyzed to evaluate the current/time area closures and to determine the effect of all the proposed closures. To select areas for proposed closures, NMFS initially analyzed both absolute numbers of discards as well as areas of highest catch and CPUE (number of animals per 1,000 hooks) for non-target HMS and protected resources (white marlin, bluefin tuna (BFT), and sea turtles). In some cases these areas overlapped, in others, they did not. This may be due to the fact that there are localized areas of high CPUE that may not necessarily represent the areas of highest bycatch in terms of absolute numbers. In order to avoid underestimation of bycatch reduction, in cases where the highest CPUE did not overlap with the areas of highest absolute numbers of discards, NMFS decided to further analyze the area that had the highest overall discards (in absolute terms), rather than areas with the highest CPUE. Thus, NMFS selected proposed closed areas and based the redistribution of effort analyses on absolute numbers to maximize the reduction in overall number of discards.

To analyze the effect of current closures, the reported catch and discards for each species and the number of hooks set were pooled by month. In a few of the tables that reported the results of the current time/area closures the number of hooks were presented as "Number of hooks set (x1000)"; NMFS believes that this led to the confusion where the reviewers thought CPUE were calculated as the number of animals per 1,000 hooks. In these tables, however, the number of hooks was meant to be multiplied by 1,000 to calculate the total monthly number of hooks; these numbers were not standardized by 1,000 nor were CPUEs or the number of animals captured per 1,000 hooks calculated in the tables. Instead, the monthly and annual Atlantic wide

totals catch and discards were calculated for each species. In the Final HMS FMP, NMFS has clarified in the text that absolute numbers were used for all analyses and refrains from using the term "catch rates," except where only appropriate. In addition, NMFS clarified the table legends so that it is clear that the numbers of hooks presented in the table are meant to be multiplied by 1,000. Therefore, the statistical sub-sampling and corresponding confidence intervals for bycatch reduction do not apply.

The reviewers stated that they could not locate any objectives or decision matrix in deciding on the preferred HMS alternatives. The reviewers felt that most of the decisions seem to correspond to a percentage reduction/increase for retained species/bycatch and associated economics. While not a formalized decision matrix, NMFS used the analyses in time/area closure section, which considered all species, to evaluate the effects of the proposed time/area closures, including all species for a combination of closures. NMFS used the results of the analyses to guide the Agency in determining which management measures are appropriate at this time. NMFS, however, cannot place more value on one species over another species and believes that setting pre-determined or pre-set reduction goals in bycatch and/or discards would compromise NMFS' ability to consider multiple species. However, the present criteria do not preclude NMFS from considering the establishment of a more formalized decision matrix in the future if such a matrix could be designed that would provide for the flexibility to consider all the species involved. This may be more appropriate when NMFS has a longer temporal dataset on the simultaneous effect of circle hooks and the current time/closures. At this time, NMFS believes that the criteria contained in the preferred alternative B5 provides the guidance needed, consistent with the Magnuson-Stevens Act and this FMP, to help NMFS make the appropriate decisions regarding the use of time/area closures in HMS fisheries.

The reviewers stated that NMFS should consider a re-evaluation of those alternatives that represent a moderate closed area, such as B2(a) and B2(f), which provide substantial bycatch reduction of white and blue marlin, sailfish, and sea turtles. The reviewers also asked if the negative impacts resulting from these closures could have been from redistribution of effort into the Atlantic and associated higher catch rates. NMFS considered a range in closures both in time and spatial size. NMFS re-evaluated the impact of B2(a) with redistribution of effort in the Gulf of Mexico only as well as redistribution of effort in the Gulf of Mexico and into an area outside of the Gulf of Mexico (*i.e.*, Area 6; see response to the Skomal review) that NMFS has shown vessels from the Gulf of Mexico currently fish in. With redistribution of effort in the Gulf of Mexico only, NMFS predicted increases in sailfish discards (1.8 percent or 18 discards/over three years; annual estimates can be obtained by dividing by three), spearfish discards (3.3 percent or 14 discards/over three years), pelagic shark discards (0.3 percent or 112 discards/over three years), large coastal shark discards (3.6 percent of 598 discards/over three years), swordfish discards (4.4 percent or 1,635 discards/over three years), yellowfin discards (22.3 percent or 1,224 discards/over three years), bigeye tuna discards (0.4 percent or 4 discards/over three years), and BAYS tuna discards (1.0 percent or 91 discards/over three years). With redistribution of effort in the Gulf of Mexico and Area 6, NMFS predicted increases in sailfish (4.7 percent or 61 discards/over three years), pelagic sharks (4.4 percent or 834 discards/over three years), BFT discards (1.6 percent or 35 discards/over three years), and BAYS tuna discards (0.7 percent or 70 discards/over three years). Therefore, increases in bycatch are predicted from the redistribution of effort into the Atlantic as well as the Gulf of Mexico. Given the potential

negative ecological impact of B2(a) under the different redistribution of effort scenarios, NMFS is not preferring alternative B2(a) at this time.

NMFS did not further analyze alternative B2(f) as outlined in Chapter 2. When redistribution of fishing effort was considered, a seven-month closure for alternative B2(f) was predicted to result in an increase in the number of swordfish, BFT, and bigeye tuna discards (2,081, 219, and 150 discards over three years for the seven-month closure, respectively). NMFS compared possible reductions and increases of discards and retained catch with the redistribution of effort for B2(f) with results from other closures. For instance, B2(f) is larger in size than B2(a). Thus, NMFS would expect a greater ecological benefit in terms of bycatch reduction from the larger B2(f) closure rather than the smaller B2(a) closure. However, the model predicted comparable results in terms of bycatch reduction between B2(a) and B2(f). In addition, B2(a) would not have resulted in as many BFT discards or potentially had as large of a negative economic impact in terms of a reduction in retained catch as B2(f). B2(f) is also smaller than B2(d). However, NMFS choose to analyze the larger closure to better assess the ecological, social and economic impacts of a large closure in the Gulf of Mexico. Therefore, by further analyzing B2(a) and B2(d), NMFS was able to analyze a range in terms of potential ecological, social, and economic impacts with regard to the size of a closure in this area of the Gulf of Mexico.

The reviewers felt that the rationale for preferred alternative B4 and benefit to HMS species appears extremely vague. Alternative B4 implements complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserves. The reviewers stated that there was no indication as to the spatial size of such reserves and were confused by the statement that "any positive ecological impacts on HMS are expected to be minimal." The reviewers asked why the Gulf Fishery Management Council cannot enact appropriate regulations since the gag grouper problems and pelagic fishing exploitation appear mutually exclusive.

Complementary HMS management measures for the Madison-Swanson and Steamboat Lumps Marine Reserves are being preferred at the request of the Gulf of Mexico Fishery Management Council. The purpose of this alternative is to implement compatible HMS regulations in the Madison-Swanson and Steamboat Lumps Marine Reserves to provide protection for spawning aggregations of gag grouper to prevent overfishing, improve spawning success, protect a portion of the offshore population of male gag grouper, and facilitate continued evaluation of the effect and usefulness of marine reserves as a fishery management tool. Similar management measures are already in effect for holders of southeast regional permits. The complementary HMS management measures would close any potential loopholes by extending the closure regulations to all other vessels that could potentially fish in the areas. As a result, this alternative is expected to improve the enforcement of the Madison-Swanson and Steamboat Lumps Marine Reserves. Only minor impacts on HMS fisheries are anticipated because the marine reserves are relatively small, and little HMS fishing effort has been reported in these areas (*i.e.*, a total of three sets were recorded between 1996 and 2004). In addition, in the Draft HMS FMP and the Final HMS FMP, there is a figure that shows the spatial extent of these two reserves. In Chapter 2 of the Draft HMS FMP and the Final HMS FMP, it is explained that the Madison-Swanson Marine Reserve is 115 nm^2 in size, rectangular-shaped, and is positioned southwest of Apalachicola, FL (29° 17' N. Lat., 85° 50' W. Long. to 29° 17' N. Lat., 85° 38' W.

Long. to 29° 06' N. Lat., 85° 38' W. Long. to 29° 06' N. Lat., 85° 50' W. Long.). The Steamboat Lumps marine reserve is 104 nm^2 in size, rectangular-shaped, and is positioned due west of Clearwater, FL (28° 14' N. Lat., 84° 48' W. Long. to 28° 14' N. Lat., 84° 37' W. Long. to 28° 03' N. Lat., 84° 37' W. Long. to 28° 03' N. Lat., 84° 48' W. Long.

Finally, the Gulf of Mexico Fishery Management Council does not have the authority to change HMS regulations. Therefore, they have requested that NMFS implement complementary management measures in these areas.

The reviewers stated that the preferred alternative, B5, appeared to be straightforward, but did not add much more to the status quo. The reviewers asked if the current FMP already has criteria for regulatory framework adjustments for closures, given the fact that closures currently exist. Currently, formalized criteria for establishing or modifying closures do not exist in NMFS' regulations. NMFS can implement time/area closures under framework actions; however, the current regulations only allow for time/area restrictions under framework actions. In the Final HMS FMP, NMFS prefers to change the regulations so that additions, changes, or modifications to time/area closures would also be allowed under a framework action. The Final HMS FMP would further allow NMFS to change or implement a new time/area without an FMP amendment. Finally, NMFS prefers to establish the criteria to help make the overall process of implementing and/or modifying current time/area closures more transparent.

Appendix A was a very necessary appendix for following the discussion in section 4.1.2.

Specific Comments:

Essential Fish Habitat

B.1.1.2 Atlantic Bigeye Tuna (*Thunnus obesus*)

The reviewer stated that NMFS' description of bigeye tuna depth distributions to a depth of 250 m may have been incorrect. The reviewer was surprised, since archival tag data show routine behavior to 400 m and deeper, and much older studies also indicate these depths as part of the habitat in the Pacific. NMFS agrees that Atlantic bigeye tuna are regularly found deeper than 250 m and has amended the section to reflect this change. The new description currently reads "Although its distribution with depth in the water column varies, it is regularly found in deeper waters than are other tuna, descending to 300–500 m and then returning regularly to the surface layer (Musyl *et al*., 2003)."

E.5 Peer Review by Paul J. Rago, NMFS NEFSC, January 25, 2006

Assigned Sections:

A. Standardized Bycatch Reporting Methodology
    1. Section 3.8.2 Standardized reporting of bycatch
B. Time/Area Closure Analyses
    1. Section 4.1.2 Time Area Closures
    2. Appendix A. Time/Area Closures
C. Essential Fish Habitat
    1. Chapter 10. Essential Fish Habitat
    2. Appendix B. Essential Fish Habitat

A. Standardized Bycatch Reporting Methodology
1. Section 3.8.2 Standardized reporting of bycatch, pp 3-191 to 3-201.

This section primarily contains descriptive material on Standardized Bycatch Reporting Methodology (SBRM) and the data collection procedures for the various fisheries that harvest highly migratory species. The descriptive material draws heavily from the work of the National Working Group on Bycatch (NWGB) and other national initiatives on bycatch analyses. The discussions of tradeoffs between precision and sampling effort, and measures to estimate bias are useful. The report continues with a description of the two major sources of bycatch data—mandatory logbooks and fisheries observers. It further notes that the two sources of information can be used together to estimate total bycatch wherein logbook effort estimates are multiplied by observer-based bycatch rates.

This approach is used in the Pelagic longline fishery (Sec. 3.8.2.1). In recent years, observer sampling rates for this fishery were fairly high (6-9%) overall and 100% in the NED experimental fishery. The stratification by area and quarter should be sufficient to address spatial and temporal heterogeneity issues.

The purse seine fishery (3.8.2.2) also uses both observers and mandatory reporting but bycatch rates are apparently too low to warrant much observer coverage in recent years.

The shark bottom longline fishery (3.8.2.3) uses a combination of voluntary observer coverage (i.e., vessel is not required to take observer when asked) and a mandatory logbook for a subsample (20%) of the fleet. The sampling design seems appropriate, but the lack of validation of the bycatch rates reported by the selected fishermen compromises estimates based on this approach. If fleet size and number of trips makes it infeasible to require logbooks for all vessels, then some effort should be made to conduct experiments to validate voluntarily reported bycatch rates. For example, one could compare bycatch rates from selected vessels with and without observers present. In addition, use of observers on vessels not required to use logbooks, could be useful. Such experiments would provide a measure of the validity of the self-reported bycatch rates. As the report acknowledges earlier, self-reported bycatch estimates are likely to be negatively biased.

The shark gillnet fishery (3.8.2.4) is the first section that mentions estimated precision levels and required sampling effort. My comments regarding section 3.8.2.3 can be applied here as well.

Discussions of commercial (3.8.2.5) and recreational (3.8.2.6) handgear fisheries note either no estimates of bycatch or very imprecise estimates, respectively. These problems are well known and the efforts to collect improved estimates from the Charter/Headboat component should greatly improve our understanding of this harvest sector.

Section 3.8.4 (Evaluation and Monitoring of Bycatch) refers to section 3.4 for species specific information. Estimates of the CVs of bycatch estimates do not appear to be reported in this chapter. If available, a summary table showing the sampling coverage, bycatch rates, and CVs would be a useful contribution to the EA. It would also be useful to describe the types of estimators used in this EA. I have inferred that most are ratio based estimators within some sort of stratified design. If model based estimators, such as Generalized Additive Models, have been used, it would be useful to include some background information on same.

Section 3.8.5.2 on discard mortality is a useful summary of difficult topic. Inclusion of information on the Code of Angling Ethics, is also a useful contribution.

Overall the SBRM describes the fisheries and monitoring systems well. Available data may not yet permit useful estimates of precision or evaluations of accuracy. Research on both of these topics should be continued. Voluntary submissions of bycatch can be difficult to decipher. True zeros or low numbers are difficult to distinguish from under reporting or failure to report. As noted earlier, large scale comparisons among bycatch rates for observed and non-observed vessels should be conducted to support expansions based on subsets of total trips.

B. Time/Area Closure Analyses

1. Section 4.1.2 Time Area Closures; Pp 4-20 to 4-101

2. Appendix A. Time/Area Closures

The time area closure model is based on generally accepted principles in fisheries science. In general such models rely on a set of assumptions related of assumptions related to static patterns of relative abundance at some temporal and spatial resolution, limited consideration of fish movements, and incomplete understanding of the effects of closure areas on redistribution of fishing effort. Nonetheless, such models can provide useful insights for comparisons of alternative management strategies. This is the approach taken within this Draft EIS. Twelve combinations of seasonal and spatial closures are evaluated in Section 4.1.2. Without such a model there would be no pragmatic way of comparing the proposed closed areas. In general it is probably safe to assume that the limitations of the model will be comparable across alternatives. Thus the rankings of each alternative should be relatively insensitive to the assumptions.

The model assumptions and application are well described in Appendix A. In particular the comparisons of model results with and without redistribution of existing effort are shown clearly. It should be noted however, that the use “plus” and “minus” signs in the Appendix is not

consistent. Table A.1 uses a minus sign to denote a decrease in discards, and plus for increases. In contrast, Table A.28 uses a minus to denote an increase in discards and plus sign to denote a decrease. This can be seen in table A.1 for Loggerhead discards under alternative B2(d) with redistribution of effort (p.A-6) which has a value of 117. In table A.28 in the total column for column I (p. A-37) the comparable value is -117. It may be useful to make the example consistent with the usage elsewhere in the document.

For any given management alternative, the lack of consistent effects across species is also a useful conclusion from the time-area closure model. It highlights the complexity of the bycatch estimation and illustrates the importance of general effort reduction in conjunction with closure strategies. For example, it might be argued that the demonstrated declines in bycatch associated with the existing closures (alternative B1) seem to be related to a 15% reduction in effort induced by, or coincident with, the closure areas (p. 4-38).

The model discussion could be improved by emphasizing some of the assumptions more explicitly. Past patterns can be used to predict future patterns of abundance only if the distributions are persistent across years. The model assumes that CPUE or bycatch per unit effort is independent of the amount of effort present in the open area. The initial distribution of CPUE may be a valid estimate of conditions at the start of the closure. However, if fishing mortality is sufficiently high to reduce abundance, then CPUE will decline. Under these conditions, the use of a dynamic model that links abundance levels between closure periods or among closure areas would be an appropriate tool. Data necessary to support such a model for management do not appear to exist at present. Consideration should be given to the development of an operational/simulation model that embeds hypothesized fish movement patterns, fleet dynamics, and arbitrary closure area times and boundaries. Such a model would elucidate the effects of the current model assumptions that do not appear to explicitly treat species-specific movements among open and closed areas.

As noted in the report, the fleet itself is highly mobile and its ability to find fish concentrations in the open areas would tend to further diminish the effectiveness of the closure areas. By the same token, fleet mobility may also allow it to move away from high concentrations of undesirable bycatch. Fleet mobility, coupled with appropriate incentives (positive or negative) could lead to reduced bycatch. In the absence of such incentives, the assumption that fleet effort is uniformly redistributed over the open areas, is compromised. Fishermen seek profits rather than CPUE. Thus the assumptions about redistribution of effort in response to management alternatives might be improved by considering redistributions based on another simplified model, such as distance from shore or some other surrogate measure for variable costs. It may be too facile to state that the "with" and "without" redistribution of effort scenarios are sufficient to bound the effectiveness of management alternatives.

The efficacy of alternative B5 would be enhanced by developing a comprehensive procedure for evaluating tradeoffs among alternatives. Otherwise the proposed process is rather ambiguous and seems to mimic the standard Council process. All of the factors listed need to be considered and the goals of transparency and predictability are noble. However, the huge number of potential alternatives need to be evaluated and ranked quickly. Otherwise, the debates will paralyze the process. Formal procedures for considering multiple objectives and constraints, and establishing tradeoffs should be an adjunct to this alternative.

On an editorial note, I found the use of CPUE to describe both landings (kept) and discard measures somewhat confusing. This ambiguity is especially confusing when one is considering the effects of reallocating effort in response to closed areas. In general one would expect the reallocation to be redirected toward areas of highest kept CPUEs rather than high discard CPUEs.

Overall the analytical approach seems sound. It is consistent with the limitations of the data and lack of explicit understanding of migrations. Improvements may be possible by incorporating explicit movement patterns of the fish and protected resources, and fleet dynamics. Such improvements to model structure would have to be weighed against the suitability of existing data to support such a model, and the available time to implement such a model. If sufficient time is not available, then development of such a model should be considered as part of future management of HMS.

C. Essential Fish Habitat

1. Chapter 10. Essential Fish Habitat

2. Appendix B. Essential Fish Habitat

This review of EFH appears to be very thorough. The review is not restricted to the published literature and appears to fully, and appropriately use the existing databases from a wide number of government and private institutions. Moreover, the review draws extensively from experts in the scientific community. Both Chapter 10 and Appendix B are well written and technically sound.

The difficulties of evaluating EFH for HMS are perhaps best stated on page 10-20 "…the quantitative relationships between fishery production and habitat are very complex, and no reliable models currently exist. Accordingly, the degree to which habitat alterations have affected fishery production is unknown."

Appendix B appears to be an extraordinarily comprehensive and thorough compilation of existing data on the life history and distribution of HMS. The only cautionary comment I would have is that one should be careful when drawing conclusions about distributions derived from multiple data sets. Apparent habitat associations can be aliased with the sampling domains of specific programs. Different gears, sampling strategies and so forth can make it difficult to distinguish differences in sampling intensity from differences in true habitat usage. Percentile scale measures (e.g., quartiles) could be considered when multiple databases are depicted

E.6 Response to OMB Peer Review by Paul J. Rago, NMFS NEFSC, January 25, 2006

A. Standardized Bycatch Reporting Methodology

1. Section 3.8.2 Standardized reporting of bycatch. Pp 3-191 to 3-201

The reviewer appears to have been confused regarding the observer coverage and reporting requirements for the shark bottom longline fishery. To clarify, vessels are currently required to take an observer when selected, voluntary coverage was employed prior to this. In

addition, all vessels participating in the bottom longline fishery are required to submit logbook reports for each trip. NMFS agrees that the analyses suggested by the reviewer to compare bycatch rates between observed and reported trips are still valid and should be conducted. Observer coverage and reporting requirements for the shark gillnet fishery are also similar in addition to the one hundred percent observer coverage required during right whale season.

The reviewer notes the lack of or imprecise estimates of bycatch in the commercial and recreational handgear fisheries. NMFS recognizes the desire to make improvements in the collection of recreational (and commercial) handgear catch and landings data. At the request of NMFS, the NAS recently conducted a review of marine recreational surveys, both state and federal. The review committee's report has been published and the Agency is evaluating the recommendations.

B. Time/Area Closure Analyses

1. Section 4.1.2 Time Area Closures; Pp 4-20 to 4-101

2. Appendix A. Time/Area Closures

The reviewer noted that the use of "plus" and "minus" signs in the Appendix A was not consistent. In the Draft HMS FMP, Table A.1 used a minus sign to denote a decrease in discards, and a plus for increases. In contrast, Table A.28 used a minus to denote an increase in discards and a plus sign to denote a decrease. This could be seen in Table A.1 for loggerhead discards under alternative B2(d) with redistribution of effort, which had a value of 117. In Table A.28 in the total column for column I, the comparable value was -117. The reviewer stated that it may be useful to make the example consistent with the usage elsewhere in the document. NMFS recognized this inconsistency and made all the minus and plus sign consistent throughout Appendix A and other appropriate chapters.

The reviewer stated that it might be argued that the demonstrated declines in bycatch associated with the existing closures (alternative B1) seem to be related to a 15 percent reduction in effort induced by, or coincident with, the closure areas. While NMFS agrees that the reduction in bycatch may be related to the current time/area closure, NMFS also realizes that other factors may be attributing to the decline. These include: (1) stocks may be declining; (2) time/area closures may have acted synergistically with declining stocks to produce greater declines in catch than predicted; (3) fishermen may have left the fishery; and (4) fishing effort may have been displaced into areas with lower CPUEs.

The reviewer stated that the model discussion could be improved by emphasizing some of the assumptions more explicitly. The reviewer suggested that past patterns can be used to predict future patterns of abundance only if the distributions are persistent across years. NMFS explored different assumptions regarding the movement of the PLL fleet and how more limited movements by the fleet may affect predictions regarding bycatch reduction. As explained in the response to the Skomal review, NMFS investigated the movement of the PLL fleet from 2001 through June of 2004 to see where vessels fished in relation to their reported homeports. Based on these analyses, NMFS evaluated different scenarios of the redistribution of effort model where each scenario had different assumptions regarding where effort from a closure would be

displaced. Taken with the results of not considering redistribution of effort to the full effort redistribution model, these additional scenarios provide estimates of changes in bycatch and retained catch somewhere in-between the two base scenarios (*i.e.*, some movement is expected, and thus, some redistribution of effort is expected into a particular area).

The reviewer stated that the model assumes that CPUE or bycatch per unit effort is independent of the amount of effort present in the open area. The initial distribution of CPUE may be a valid estimate of conditions at the start of the closure. However, if fishing mortality is sufficiently high to reduce abundance, then CPUE would decline. Under these conditions, the use of a dynamic model that links abundance levels between closure periods or among closure areas would be an appropriate tool. Data necessary to support such a model for management do not appear to exist at present. The reviewer suggested that consideration should be given to the development of an operational/simulation model that embeds hypothesized fish movement patterns, fleet dynamics, and arbitrary closure area times and boundaries. Such a model would elucidate the effects of the current model assumptions that do not appear to explicitly treat species-specific movements among open and closed areas.

NMFS acknowledges that the redistribution of effort model is incapable of making predictions based on a declining CPUE. Instead, the model assumes a current CPUE that remains constant in the remaining open areas when estimating reductions. While NMFS would like to develop a dynamic model that links abundance levels between closure periods or among closure areas, as the reviewer has pointed out, the data necessary to build such a model are not available at the present time. NMFS is working on improving the effort redistribution models to be used in the future as more appropriate data become available.

The reviewer stated that as noted in the VMS remand report, the fleet itself is highly mobile, and its ability to find fish concentrations in the open areas would tend to further diminish the effectiveness of the closure areas. By the same token, the reviewer argued that fleet mobility may also allow it to move away from high concentrations of undesirable bycatch. Fleet mobility, coupled with appropriate incentives (positive or negative) could lead to reduced bycatch. In the absence of such incentives, the assumption that fleet effort is uniformly redistributed over the open areas is compromised. The reviewer stated that fishermen seek profits rather than CPUE. Thus, the reviewer suggested that the assumptions about redistribution of effort in response to management alternatives might be improved by considering redistributions based on another simplified model, such as distance from shore or some other surrogate measure for variable costs. The reviewer stated that it may be too facile to state that the "with" and "without" redistribution of effort scenarios are sufficient to bound the effectiveness of management alternatives.

Predicting fishermen's behavior in light of changing management measures is difficult. In addition, while many fishermen may want to avoid bycatch, many of the retained HMS coexist with non-target HMS, such as bluefin and yellowfin tuna in the Gulf of Mexico. Therefore, it could be potentially difficult for fishermen to avoid bycatch while fishing for retained HMS. However, NMFS is considering research on how changes in fishing practices may help reduce bycatch on non-target species as well as the tracking of discards (dead and alive) by all gear types. NMFS is also considering developing incentives that would dissuade

fishermen from keeping incidentally caught species, such as BFT. This is of particular concern for incidentally caught spawning BFT in the Gulf of Mexico.

In the future, NMFS intends to investigate the choices fishermen have made regarding previous closures (*i.e.*, did they move, sell their permits, go out of business, retain their permit but fish for something else, etc?). This type of analysis could help NMFS improve the redistribution of effort models used in the future. While the current redistribution of models may appear overly simplified, they account for the fact that effort would be displaced out of closed areas and acknowledge that there are likely to be areas where bycatch might increase. However, NMFS will continue investigate ways to better predict fishermen's fishing behaviors and refine the current redistribution of fishing effort models.

The reviewer stated that the efficacy of alternative B5 would be enhanced by developing a comprehensive procedure for evaluating tradeoffs among alternatives. Otherwise the reviewer felt that the proposed process was rather ambiguous and seems to mimic the standard Council process. The reviewer noted that all of the factors listed need to be considered and stated that the goals of transparency and predictability are noble. However, the reviewer felt that the huge number of potential alternatives needed to be evaluated and ranked quickly. Otherwise, the debates would paralyze the process. The reviewer said that formal procedures for considering multiple objectives and constraints, and establishing tradeoffs should be an adjunct to this alternative.

As explained in the responses to the Skomal and the Bigelow and Boggs review, while not a formalized decision matrix, NMFS used the analyses in time/area closure section, which considered all species, to evaluate the effects of the proposed time/area closures, including all species for a combination of closures. NMFS used the results of the analyses to guide the Agency in determining which management measures are appropriate at this time. This approach does not preclude NMFS from considering the establishment of a more formalized decision matrix in the future if such a matrix could be designed that would provide for the flexibility to consider all the species involved. This may be more appropriate when NMFS has a longer temporal dataset on the simultaneous effect of circle hooks and the current time/closures. At this time, NMFS believes that the criteria contained in the preferred alternative B5 provides the guidance needed, consistent with the Magnuson-Stevens Act and this FMP, to help NMFS make the appropriate decisions regarding the use of time/area closures in HMS fisheries.

The reviewer felt that the use of CPUE to describe both landings (kept) and discard measures somewhat confusing. The reviewer stated that this ambiguity was especially confusing when one was considering the effects of reallocating effort in response to closed areas. The reviewer stated that one would expect the reallocation to be redirected toward areas of highest kept CPUEs rather than high discard CPUEs.

As explained in the response to the Bigelow and Boggs review, NMFS did not use CPUEs for its final selection of time/area closures. Only absolute numbers of bycatch, discards, and retained catch were used to select areas for potential closures, and absolute numbers were used for its analyses of both with and without the redistribution of fishing effort. The redistribution of effort scenarios calculated increases in bycatch, discards, and retained catch by

multiplying the effort that was being redistributed from a given closures by the CPUE for each species in the particular open areas under consideration (*i.e.*, either all remaining open areas, the Atlantic seaboard only, the Gulf of Mexico only, or the Gulf of Mexico and Area 6 in the Atlantic). NMFS then subtracted this number from the estimated reduction inside the closed area. Since many of these areas include areas of high CPUEs for both targeted catch as well as non-target catch, it would be almost impossible to redistribute effort to areas of high CPUEs for retained catch only. However, NMFS intends to investigate the choices fishermen have made regarding previous closures (*i.e.*, did they move, sell their permits, go out of business, retain their permit but fish for something else, etc?). This type of analysis could help NMFS improve the effort redistribution models to be used in the future.

The reviewer suggested that improvements may be possible by incorporating explicit movement patterns of the fish and protected resources, and fleet dynamics. The reviewer stated that such improvements to model structure would have to be weighed against the suitability of existing data to support such a model, and the available time to implement such a model. The reviewer noted that if sufficient time is not available, then development of such a model should be considered as part of future management of HMS. NMFS acknowledges that improvements can be made to the current redistribution of effort model; however, at this time, NMFS does not have the necessary data to make such improvements nor did NMFS have sufficient time between the Draft HMS FMP and the Final HMS FMP to investigate and reanalyze the data with regards to a substantially different redistribution of effort model. NMFS is working on improving the effort redistribution models used in the future as more appropriate data become available.

C. Essential Fish Habitat

1. Chapter 10. Essential Fish Habitat

2. Appendix B. Essential Fish Habitat

The peer reviewer noted that "Appendix B appears to be an extraordinarily comprehensive and thorough compilation of existing data on the life history and distribution of HMS. The only cautionary comment I would have is that one should be careful when drawing conclusions about distributions derived from multiple data sets. Apparent habitat associations can be aliased with the sampling domains of specific programs. Different gears, sampling strategies and so forth can make it difficult to distinguish differences in sampling intensity from differences in true habitat usage. Percentile scale measures (e.g., quartiles) could be considered when multiple databases are depicted."

NMFS agrees that the sampling program, strategy, and methodology used may have an influence on the apparent distribution of a particular species, and that one should use caution when interpreting the results. In part this is why NMFS has included the names of the programs used to collect the data and the number of observations contributed by each program. This additional information should help NMFS technical experts to decide how much weight should be given to a particular dataset. NMFS plans to convene workshops with technical experts who will thoroughly review the data and help to make a determination about which areas should be included as EFH. The distribution data in the maps will one of many contributing factors in that ultimate decision.